

REMARKS

Claims 1-46 are pending in the application. Claims 1-15 and 17-46 are rejected. Claim 16 is objected to.

Claims 1-3, 9, 20, 29, 44, and 46 were rejected pursuant to 35 U.S.C. §103(a) as being obvious over Roth (U.S. Patent No. 5,315,512) in view of Urbano et al. (U.S. Patent No. 5,976,088) or Hossack et al. (U.S. Patent No. 5,924,991). Claims 2 and 33-35 were rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Roth in view of Urbano et al. or Hossack '991, and in further view of Mo et al. (U.S. Patent No. 6,012,458). Claim 4 was rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Roth in view of Urbano et al. or Hossack '991, and in further view of Hoff et al. (U.S. Patent No. 6,315,730). Claims 5-8, 10-11, 21-28, 30, 36, 38-43, and 45 were rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Roth in view of Urbano et al. or Hossack '991, and in further view of Ramamurthy et al. (U.S. Patent No. 5,846,202). Claim 12 was rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Roth in view of Urbano et al. or Hossack '991 and in further view of Ramamurthy et al. and Hoff et al. Claims 13 and 32 were rejected pursuant 35 U.S.C. §103(a) as being unpatentable over Roth in view of Urbano et al. or Hossack '991, and further in view of Ramamurthy et al. and Holupka (U.S. Patent No. 5,810,007). Claims 14-15 and 17-19 were rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Roth, Urbano et al. or Hossack '991, and further in view of Greer et al. (U.S. Patent No. 5,959,622). Claim 31 was rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Roth in view of Urbano et al. or Hossack et al., further in view of Ramamurthy et al., and further in view of Hossack et al. (U.S. Patent No. 6,042,545). Claim 37 was rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Roth in view of Urbano et al. or Hossack et al., further in view of Ramamurthy et al., and further in view of Hoff et al.

Claim 16 was objected to as allowable if rewritten in independent form.

Applicants respectfully request reconsideration of the rejections of claims 1-15 and 17-45, including independent claims 1, 21 and 29.

In both the previous Office Action of November 19, 2004 and the current Final Office Action of June 6, 2005, the Examiner has relied on Holupka et al. (U.S. Patent No. 5,810,007) and Greer et al. (U.S. Patent No. 5,959,662). However, Applicants have been unable to find

either of these references listed on a Form PTO-892. Applicants respectfully request that the Examiner also enter these references into the record for this file so that they will also be listed as cited references when the application is allowed.

Independent claims 1 and 29 were rejected pursuant to 35 U.S.C. §103(a) as being obvious over Roth in view of Urbano et al. or Hossack et al. Independent claim 1 claims a processor operative to recognize one or more non-cyclical distinguished events and to select a portion of an ultrasound examination based on the recognition of the one or more distinguished events. As noted at paragraph 28 in the application, R-wave peaks alone do not qualify as non-cyclical distinguished events.

As noted by the Examiner, Roth does not recognize non-cyclical distinguished events. Urbano et al. or Hossack '991 are relied on to show a non-cyclic distinguished event.

Urbano et al. obtain a single pre-contrast image and a single post-contrast image at a predetermined point of interest in cardiac cycles (Col. 18, line 67 – Col. 19, line 4). The event to trigger acquisition is a QRS or heart cycle timing signal (Col. 18, lines 60-67). Two images from two cycles are acquired based on a trigger corresponding to a regular or cyclical event in the cardiac cycle. Because Urbano et al. acquire at a predetermined point of interest (e.g. R wave), a cyclic distinguishing event is used. The pre and post contrast images are the result of triggering in different cycles, not of active triggering. Thus Urbano et al. do not show the processor distinguishing between these two pre and post contrast events, but instead use heart cycle timing. Because Urbano et al. use a cyclical predetermined trigger to acquire the images, Urbano et al. do not use a non-cyclic distinguishing event.

Hossack '991 disclose several alternatives for breath gating (Col. 10, line 67 – Col. 11, lines 6). In one, chest motion is used for cyclic gating (Col. 11, lines 3-5). In another, nostril air temperature is detected for cyclic gating (Col. 11, lines 5-6). The chest motion and nostril temperature embodiment detect cyclical events, not a non-cyclical distinguished event. Another alternative is to simply have the patient hold their breath during the ultrasound scan (Col. 11, lines 1-3). The alternative of simply holding the breath does not have a processor detect any event. The patient is asked to hold their breath, and then the scan is performed. Thus Hossack '991 does not disclose a processor operable to recognize a non-cyclical distinguished event.

Claim 29 claims inputting data to an event recognition processor and processing whether a non-cyclical distinguished event has occurred. As discussed above, Roth, Urbano et al. and Hossack '991 use cycle information to select data, not a non-cyclical event.

Independent claim 21 was rejected pursuant to 35 U.S.C. §103(a) as being unpatentable over Roth in view of Urbano et al. or Hossack '991 and in further view of Ramamurthy et al. Independent claim 21 claims marking or storing non-repeating subsets of an examination where the one or more non-repeating subsets are bracketed by one or more pairs of distinguished events. As discussed above, Roth uses cycle or repeating information to select data. Similarly and even as noted by the Examiner, Ramamurthy et al. use repeating triggers (see Figs. 2B, 3B and 4B-D). Thus Roth and Ramamurthy et al. use repeating gating or triggers.

Applicants respectfully submit that a person of ordinary skill in the art would not have used the teachings of Ramamurthy et al. with Roth. Roth collects a fully sampled set of data for later decimation or gating to identify the desired frames (Col. 9, lines 5-16). Conversely, Ramamurthy et al. trigger acquisition so that data is only acquired at certain times (Col. 6, lines 1-7; Col. 6, lines 42-56) or vary a parameter at different time (Col. 8, lines 47-62). A person of ordinary skill in the art would not have used the acquisition based triggering and associated teaching of Ramamurthy et al. with the systems and method of Roth adopted to select from or gate a fully sampled previously acquired examination.

Urbano et al., as discussed above, detects two cyclical events. To acquire the two images (pre-contrast and contrast), heart cycle gating is disclosed. The trigger events are repeating heart cycle triggers, so Urbano et al. does not disclose marking or storing non-repeating subsets bracketed by distinguished events.

Hossack '991 use repeating breath gating or merely avoid detecting events by having the patient hold their breath. Hossack '991 does not disclose marking or storing non-repeating subsets bracketed by distinguished events.

Dependent claims 2-20, 22-28, and 30-46 depend from the independent claims 1, 21, and 29 discussed above, and are thus allowable for at least the same reasons. Further limitations distinguish over the reference or references used to reject the dependent claims.

For example, claims 2 and 3 have been previously amended in the Office Action Response and Amendment of February 22, 2005 to correct antecedent basis. The Examiner premises the rejection on a lack of antecedent basis.

Claims 2 and 33-35 claim a distinguished event based on an absence of motion. Mo et al. discard interpolated frames (Col. 5, lines 35-55). Motion is not used to distinguish an event. Additionally, Mo et al. also do not suggest reviewing motion in an image to identify an event as claimed in claim 35.

Claims 4, 12, and 37 claim determining a distinguished event based on a rate of change of brightness. Hoff et al. was cited for this disclosure. Hoff et al. disclose deriving wash-in curves from second harmonic intensities (Col. 7 lines 20-24). A plot showing a rapid rise in backscatter may be generated (Col. 8, lines 14-18). Hoff et al. merely plot a curve, but do not suggest determining an event based on a rate change. Also, a person of ordinary skill in the art would not have used the trigger based acquisition of Hoff et al. (Col. 7, line 17) with the full acquisition and later gating of Roth for the reasons discussed above regarding Ramamurthy et al.

Claim 5 claims recognizing a jet in color Doppler as an event. Ramamurthy et al. use color Doppler imaging, but do not show a processor to recognize a jet. The highest velocity mapping alone does not identify a jet event, but only results in an image of the highest velocities where the highest velocities may or may not be associated with a jet.

Claim 39 claims an event based on a rate of change of velocities. Ramamurthy et al. identify a highest velocity, but not a rate of change.

Claims 13 claims a cropping factor based upon characterization of an image. Holupka et al. crop automatically or manually with a special mask (Col. 6, lines 19-28). Holupka et al. do not suggest a cropping factor or a cropping factor based on characterization of an image.

Regarding claims 14-15 and 17-19, applicants respectfully submit that a person of ordinary skill in the art would not have used the feedback of Greer et al. in the system of Roth. Roth identifies images after an exam, and thus does not need the feedback. Roth also generally identifies one image every heart cycle or few heart cycles. The feedback of Greer et al. would be provided at the same frequency. Such frequent feedback, such as beeps or visual flashes, would be distracting and undesired in a medical environment absent an emergency.

Claim 31 claims selecting a subset of image data sets with decimation. Hossack '545 decimates within a given image (Col. 7 lines 56-58), not decimation of image data sets.


CONCLUSION

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 943-7350 or Craig Summerfield at (312) 321-4726.

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